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EXPERIMENTS WITH OSTRICHES—XIII.

THE INFLUENCE OF NUTRITION, SEASON AND QUILLING ON THE FEATHER CROP.

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With the extended experience of ostrich farming in South Africa, conducted under the most varied conditions, more and more facts are being accumulated as to the management of the bird, the whole purpose of which is the production of the finest feather crop possible. There are, however, yet many points upon which further experiment and investigation are needed to explain the varied results obtained; and perhaps no subject is more puzzling than that of the conditions under which a full and perfect crop of feathers can be assured. Too frequently an ostrich which has given a complete clipping of superior plumes will, on the next occasion, produce a nearly worthless crop, the feathers irregular in size and defective, and accompanied by many "blanks." The object of the present article is to draw attention to some of the conditions under which such incomplete crops are produced, in the hope that discussion thereon may bring forth the experience of others, and thereby lead to some solution of the difficulty.

THE INFLUENCE OF NUTRITION.

It is now accepted that to ensure a full and complete clipping of feathers, the bird must be in a high nutritive condition when quilled. The necessity for this in the starting of the crop has been impressed upon every ostrich farmer from his own experience, and has much to do with the increasing production of lucerne, rape, and other crops as food for the birds. No one now thinks of quilling birds during a drought or at such times as a plentiful food supply is lacking. The power of the bird to produce a complete and perfect clipping is found to be a more delicate matter than would have been expected from such a strong and vigorous animal as an ostrich, and among the influences concerned, nutrition must undoubtedly be placed first. Feathers are formed from the epidermal or outer layer of cells of the body, and these are highly responsive to a varying nutrition.

AN IMPROVING NUTRITIVE CONDITION DESIRABLE.

It is somewhat difficult under farming conditions in South Africa to keep an ostrich under equally good nutritive conditions all the year round, and this is not altogether necessary. The most critical period for the feather crop is during the early months of the growth of the feathers. A

crop well started can usually be depended upon to complete itself successfully, even if the bird is not kept all the time at the highest pitch of nutrition, while a somewhat lowered condition towards the close hastens the ripening of the quills by the more rapid withdrawal of the blood. Experience has proved, and physiology lends support to the notion, that a new crop of feathers is more likely to make a successful start if at the time the bird is improving or on the upgrade, as it were, as regards its nutritive condition. During the ripening of the quills some farmers prefer to allow their birds to get into a lower state than usual, and then one or two weeks before the time of quilling begin to build them up by high feeding and special treatment. Under such improving conditions we should expect that the increasing physiological vigour would be most favourable for renewing the activity of the feather germs previously allowed to become dormant.

UNDER-RIPENESS AND OVER-RIPENESS OF THE QUILLS—THE PRODUCTION OF BLANKS.

The degree to which the quills are allowed to ripen before being drawn is a matter of importance in starting a feather crop, and different practices are followed, partly dependent upon climate and partly upon the intention of the farmer as regards his birds, that is, as to how much he intends to force the growth. It is well established that a quill or feather drawn before ripeness, that is, while still growing and richly supplied with blood, is sure to be immediately followed by a new feather. This is best seen in the case of plumes which are trampled out while only partly grown. New feathers invariably appear from these sockets, and in the management of their birds some farmers take advantage of this fact and pull the quills while yet far from ripeness. The advantages are twofold: (a) time is saved, so that another clipping can be secured earlier, and (b) a full complete crop of plumes is assured, without any blanks.

Unfortunately, Nemesis, in the form of a shorter and smaller feather, follows upon this unnatural procedure, and if the practice is persisted in the feather-producing powers of the bird are greatly impaired, if not altogether ruined. Most farmers, therefore, hold it to be desirable to allow the quills to ripen to such a degree that practically all the blood is withdrawn from the medulla and the tip of the quill is becoming hard and dry. In this case the succeeding crop may be expected to be as good as the previous ones.

Where ripened quills are allowed to remain in the sockets for four or five months, the blood has largely withdrawn from the feather-germ, and naturally it takes somewhat longer to re-establish the full circulation in a dormant germ than where, as in a green quill, it has never been reduced. It is very desirable that all the feather-germs on a bird should start evenly, for feathers appearing in advance of the general crop are nearly always imperfect, while those later are usually perfect.

The production of blanks can be readily understood from a knowledge of the physiology of feather-growth. When a quill is drawn green, the feather-germ at the bottom of the socket is still in an active growing condition, and the removal of the quill at once gives the necessary stimulus to the germ, and it sets about the production of a new feather to take the place of the one lost. On the other hand, the feather-germ below a quill which has been ripe for some time is dormant, the blood is largely withdrawn from it, and though ordinarily the removal of the quill stimulates it to renewed activity, this may not occur if the bird is in a feebly nourished state, or if the seasonal conditions are unfavourable. A "blank" represents a feather socket of which the feather-germ has either been destroyed

or is dormant. In most cases the germ is only dormant, and its activity is restored on the return of favourable conditions. When a bird is quilled at an unfavourable time, the few new feathers which appear are probably from sockets in which the feather-germ had not become quite dormant, while where blanks occur the feather-germ was dormant and has not awokened to activity. Hence, speaking generally, there is a greater risk in the production of blanks from over-ripe quills than from quills under-ripe, and one must make certain that all the other conditions are favourable for beginning a new crop before drawing over-ripe quills.

EXTERNAL INDICATIONS AS TO THE CONDITION OF A BIRD FAVOURABLE FOR QUILLING.

It would be a great boon to ostrich farmers if more were known with certainty of the outward appearances which indicate whether a bird is in a favourable condition or otherwise for starting a new crop of feathers. Most farmers are content to say that their birds are fat, and in apparently excellent condition, and yet results show there is something amiss, as a full crop does not appear. In Number V. of this series of articles, published in the March issue of the "Agricultural Journal" (1908), attention is directed to the scaliness of the skin as a helpful indication of the state of the bird, and experiences since that time but serve to confirm the opinions there expressed. It is fully established that in a general way a bird will start its best crop of feathers only at such times as the skin is clean and free from scurf, and therefore the condition of the surface may be taken as one of the most reliable indications we have as to the health of the bird. Before quilling, a farmer will do well to examine the naked part of the body under the wing; if this is smooth, clean, firm and healthy-looking, he may be assured that his feather birds are in excellent condition, while if it is powdery and scaly, dry and flabby to the touch, they should be placed under better feeding conditions before quilling, or possibly an imperfect crop will result, and the birds may fail to preen properly such feathers as do appear.

SEASON AND SEXUAL CONDITION OF THE BIRD.

Many instances occur where even though a bird is apparently in excellent condition, and the food supply is lavish, yet the crop is a failure. It would appear that many of these cases can be put down to the season of the year, and it is well established, at any rate in the Eastern Province of Cape Colony, that the winter period, say, from the middle of May to the middle of August, is an unfavourable time for the beginning of a new crop of feathers. Many conspicuous examples of this fact have occurred during the winter just past, when a drought of over four months was experienced. Several birds quilled during May or June were temporarily ruined; the full crop of feathers failed to appear, and even those which did shoot out were irregular and defective. The food supply may have been to blame in some instances, but the season and climatic conditions were undoubtedly unfavourable. In one very marked case a high grade cock, feeding upon an abundance of lucerne, sent out but a few inferior feathers after being quilled at the end of May. Among a troop of feather-birds, however, not all would suffer in the same way; perhaps half would give an imperfect crop, while the others would shoot out feathers from all the sockets: so that a certain amount of individuality is involved.

In a previous article it has been shown that the sexual stage of the bird also has much influence upon its feather-producing capacity. Speaking generally, the best feathers are grown during the non-breeding season of



Fig. 1.—Plume grown by Mr. Hilton Barber, Halesowen, from "Old Jack," at the age of 35 years.

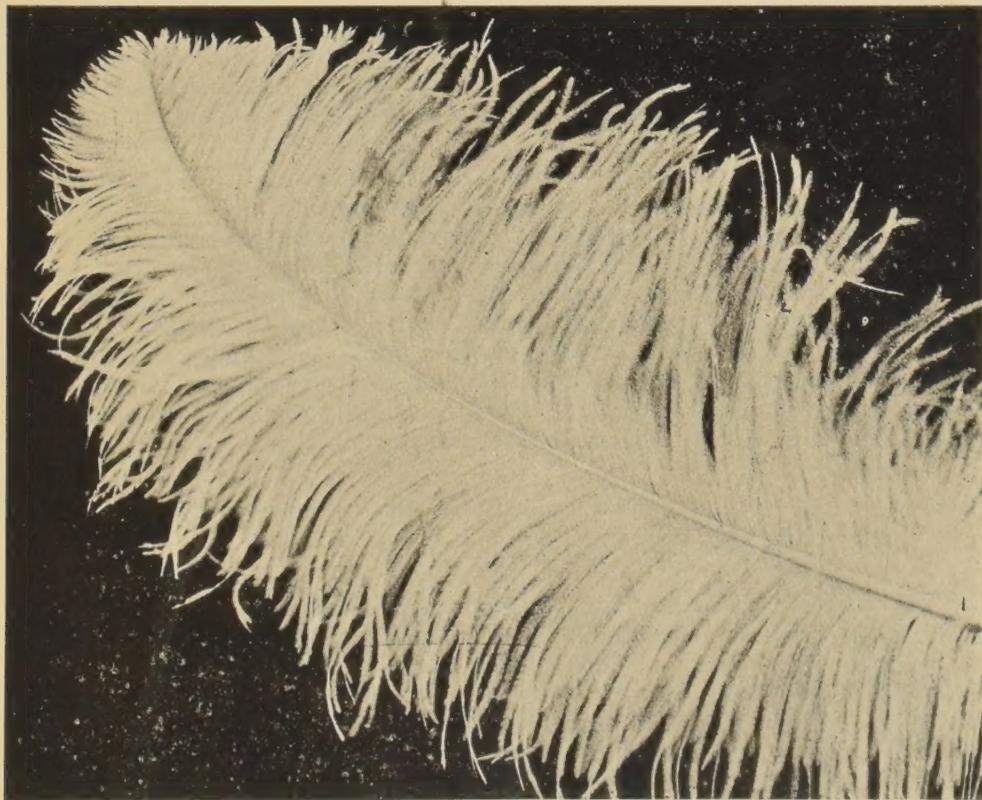


Fig. 2.—Plume grown by Mr. Harry Moss, Grahamstown, from a cock at least 35 years old.

the year, and the best time for quilling is the same as that for natural moulting, namely, such a time as will bring the feather to ripeness at about the beginning of the mating season. The actual dates for this will vary somewhat in different districts, but in the Eastern Province the best times for quilling are from October to February.

RECOVERY OF BLANKS AND EVENNESS OF CROP.

The presence of an uneven crop of feathers is a source of loss and trouble to an ostrich-farmer, and perhaps no better test of his ability to manage a troop of birds can be shown than by having his clippings even and complete, his birds free from blanks, and feathers growing out-of-time. This, however, is by no means an easy matter for, independently of the causes conducive to blanks and irregularities alluded to above, there is always the possibility of the trampling out of partly grown feathers to be considered. Under ordinary circumstances, blanks resulting from quilling out of season, or while the bird is out of condition, recover with the advent of more favourable times, if not all at once, at least following shortly upon one another. In these cases it is usual to clip the various plumes as they mature, and delay the quilling until all the quills are ripe, when the next crop will start even. This necessarily involves a loss of time, but no other method has yet been found practicable.

When, however, only a few feathers are out-of-time, it is not always worth while to wait until they ripen before evening-up the crop. And in such a case many farmers do not hesitate to pluck the partly-grown feathers at the same time as the ripe quills are drawn. As already shown, a new feather is sure to appear from these sockets, but it is not likely to be as large as those growing from the sockets of which the quills were ripe, and thus in the new crop there may be plumes of varying sizes growing side by side. In an earlier article (No. VIII.) the question was raised whether such inferior feather-producing sockets ever regain their original power. An experiment was then in progress to test the question, and has since been completed, as a result of which it can be asserted that *inferior feather-producing sockets do recover their former power, and in the succeeding crop give just as large and perfect feathers as originally.*

This result is very satisfactory from a farmer's point of view, and proves that in evening-up his crops he may confidently expect that with proper care and judicious treatment all the feather germs will recover any temporary irregularity, and each socket will produce a normal feather. It may be left to a farmer's own discretion whether or not he will pluck green feathers growing out-of-time, but he has now the satisfaction of knowing that the feather germs will subsequently recover, even though the first feather after the operation be inferior.

FOR HOW LONG WILL AN OSTRICH CONTINUE TO PRODUCE A GOOD CROP OF FEATHERS?—THE AGE OF OSTRICHES.

The question as to how long an ostrich will live and continue to produce a good crop of feathers has naturally a special interest to ostrich farmers in South Africa. The industry, however, has not been going long enough to enable us to answer the question with any degree of completeness. The ostrich was first domesticated on a farming basis only about forty-five years ago, and not much progress was made for some time. It is now impossible to trace individually any of the original wild birds with which pioneers like Hon. A. Douglass commenced, but the history of some birds can be followed for nearly forty years.

One of the best known of the older birds, whose history is well authenticated, is the famous cock "Old Jack," owned by Mr. Hilton Barber, of Halesowen. The bird is now thirty-five years old, and the following details have been kindly supplied by Mr. Gray A. Barber. He was hatched as a chick from wild birds obtained from the Kuruman district, and has himself been breeding at Halesowen for thirty years, and still has two or three nests each season. As shown by the accompanying photograph his feathers are still good, very little depreciation having taken place all through the years. The custom has been to pluck him every ten or eleven months, though this has varied a little according to his nesting periods, his feathers being left untouched while sitting. It is encouraging to learn that the old bird is still very vigorous and active, and is at present sitting on a nest of eighteen eggs.

Another celebrated bird, at least thirty-five years old, is owned by Mr. H. E. Moss, of Mosslands, near Grahamstown. The actual age of this bird seems a little uncertain, some asserting that they can trace his history for forty years, though there is no doubt whatever that he is at least thirty-five years old. Here again the bird is still capable of producing a fine crop of feathers, a plume being represented in the photograph. His last clipping of wing quills sold at the Grahamstown sales for £12 10s. per lb., and he has a nest each year.

From these two instances it is manifest that the ostrich is a very long-lived bird. If well cared for a bird at thirty-five shows little evidence of diminution in his reproductive or other powers, and is capable of producing nearly as good a crop of feathers as at any earlier period. How much longer he will retain these powers can only be surmised, but it is obvious that careful records should be preserved of the fate of birds with long and well authenticated histories. The physiological activities of the ostrich are largely reflex, not cerebral, in character and, barring accidents and disease, we have no reason to expect that his vitality may not be continued greatly beyond that of the oldest bird with which we are acquainted.

The length of time which a bird will continue to produce a good crop of feathers is unquestionably dependent upon the management of the bird, especially as concerns the frequency of clipping. We may assume that in a state of nature an ostrich, like most other birds, produces a new crop of feathers each year, and if under domestication we increase this, as is done under the eight or nine months system of quilling, we may reasonably ask whether the same quality of feathers will continue to be produced. Both Mr. Barber and Mr. Moss follow a nine or ten months system of quilling, and their clippings show little or no deterioration with age. Against this there is abundant evidence to prove that when birds are continually forced to produce a crop every eight months or less, deterioration sets in, the feathers becoming smaller and stalky. Something undoubtedly depends upon the feeding and individuality of the bird, but still the above may be taken as a general experience. The farmer will have to decide for himself whether he desires to get from his birds all they can produce in as short a time as possible, or whether he is content to allow them to do the best they can over a long period without deterioration.

It may still be asked whether birds which have undergone deterioration as a result of too frequent clippings will ever recover. Ostrich farmers generally assume that such is not the case; but this idea may possibly be founded upon imperfect evidence. We now know from experimental evidence that odd feather germs recover their original power after producing an inferior feather, and it is yet to be proved how far this will apply to the crop as a whole, and how many times the quills may with

safety be drawn while green. Certain it is that the gain from too frequent clippings is so comparatively small, and is attended with so many risks, that the careful farmer will be well advised not to adopt the method.

SUMMARY.

The chief influences which have been shown to determine the quality and completeness of the feather crop of any particular bird may now be summarised.

1. The first and most important is that of the nutritive condition of the bird at or shortly before the beginning of the crop. Only when a bird is in a high nutritive condition at quilling can we be assured of a complete even crop, the best the bird can produce.

2. An improving or upgrade nutritive condition is more likely to awaken dormant germs to activity than if the bird is kept in a uniform state.

3. Blanks are less likely to occur in sockets from which the quills when drawn are under-ripe than when drawn over-ripe, but the drawing of immature quills is found to deteriorate the succeeding crop.

4. The appearance of the skin, whether scaly or clean, is of assistance in determining whether a bird is in a suitable condition or otherwise for starting a crop of feathers.

5. The completeness and quality of the crop is partly dependent upon the season of the year, and the sexual condition of the bird. Other things being equal, the best crops are produced during the non-breeding season of the year.

6. Sockets giving blanks by quilling at unfavourable times are likely to recover under better conditions, though less likely in the case of young than of mature birds.

7. Sockets giving inferior feathers as a result of plucking the plumes while green recover their original power in the succeeding crop.

8. Under proper care and management (not quilling too frequently) an ostrich will continue to give a feather crop without much deterioration for thirty-five years, and will continue to breed for that period, and probably much longer.



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